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(54) IMAGE PROCESSOR

(57)Abstract:

PURPOSE: To execute image correction processing for the red-eye part of a picture taken by a camera.

CONSTITUTION: An arithmetic circuit 10 arithmetically operates information on the size of the red-eye of a processed object based on information whether a stroboscope is used or not in the camera, the focal distance information of a photographing lens, and the distance information between the photographing lens and a strobe light emitting part. A discrimination means 6 discriminates a red-eye area in a processed object image based on size information, red-eye color information and red-eye form information, then a processing circuit 7 performs the red-eye correction processing for changing color and brightness to a picture element in the red-eye area.
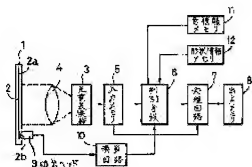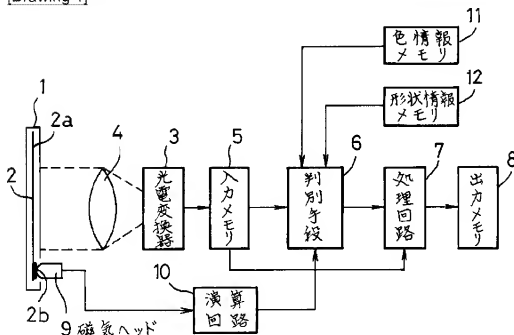
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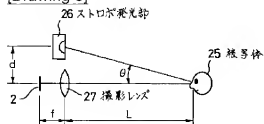damages caused by the use of this translation.

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DRAWINGS

[Drawing 1]

[Drawing 3]

[Drawing 4]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the image processing device which can carry out correction processing of the bloodshot-eyes phenomenon in which near the center of eyes is reflected to red, when the speed light photography of human being or the animal is carried out with a camera.
[0002]
[Description of the Prior Art]Since a person and an animal will become the photograph taken in the strange state if said bloodshot-eyes (red eye) phenomenon arises as indicated in photograph industry (No. 5/1989), in the camera, various kinds of bloodshot-eyes preventive measures are proposed and implemented. In order to enlarge the angle which a strobe light part and a taking lens make to ** photographic subject as a bloodshot-eyes prevention method of a camera, distance between a light-emitting part and a taking lens is enlarged.
[0003]** Give lighting to the eye of a photographic subject in advance of photography, and take a photograph after making a pupil small.
[0004]******.
[0005]The bloodshot-eyes prevention method which performs speed light photography after it performed preliminary irradiation to JP,58-48088,B and the pupil has closed about the aforementioned ** paragraph is shown.
[0006]
[Problem(s) to be Solved by the Invention]By the above-mentioned conventional technology, in the aforementioned ** paragraph, when the size of the usual camera is taken into consideration, with a camera with a built-in stroboscope, distance between a strobe light part and a taking lens cannot be made in particular so long that it is enough in order to prevent bloodshot eyes.

[0007]In the aforementioned ** paragraph, in order to illuminate a reserve, the driving means for providing a lighting member apart from a stroboscope, or carrying out minute luminescence of the stroboscope is needed, and cost rises. After making a reserve illuminate furthermore, by the time a pupil closes, for this reason, there will be a problem of missing a shutter chance, for about 1 second.

[0008]Thus, it was difficult to form the means which is the easy composition for a camera and prevents bloodshot eyes thoroughly in conventional technology without carrying out a cost hike.

[0009]The purpose of this invention is to provide the image processing device in which correction processing is possible to the bloodshot-eyes portion of the picture photoed with the camera.

[0010]

[Means for Solving the Problem]In order to attain the above-mentioned purpose, this invention divides a picture into a minute pixel, inputs it as a digital value, and is characterized by that an image processing device which performs arbitrary image processing comprises the following. An input means which inputs photographing condition information on a picture photoed with a camera.

A calculating means which calculates size information of bloodshot eyes of a processing object image based on photographing condition information from an input means.

A discriminating means which distinguishes a field in said processing object image which agrees from a calculating means to size information, bloodshot-eyes sexual desire news, and bloodshot-eyes configuration information of bloodshot eyes.

A processing means which changes a color and luminosity to a pixel in a field distinguished by a discriminating means, and carries out bloodshot-eyes correction processing.

[0011]As photographing condition information, existence information on stroboscope use, focal distance information of a taking lens, and a taking lens and distance information between strobe light parts are inputted.

[0012]

[Function]According to the above-mentioned means, bloodshot eyes to the taken image by which it is generated The existence information on stroboscope use, The size information of bloodshot eyes is calculated based on photographing condition information, including the focal distance information of a taking lens, the distance information between a taking lens and a strobe light part, etc., The field of the bloodshot eyes in the picture corresponding to this size information, the sexual desire news concerning bloodshot eyes, and configuration information is distinguished automatically, a color and luminosity are changed to the pixel in the distinguished field, and a bloodshot-eyes state is corrected.

[0013]

[Example]Hereafter, the example of this invention is described based on a drawing.

[0014]The set part to which underline drawing 1 is an explanatory view of the entire configuration of one example of this invention, and the film 2 on which 1 has the exposure photographing part 2a and magnetic recording part 2b taken a photograph is set, Photoelectric converters, such as CCD to which image formation of the picture by which 3 is photoed by the exposure photographing part 2a is carried out through the object lens 4, The input memories 5 remembers the picture signal from the photoelectric converter 3 to be as a pixel signal, The processing circuit which are a discriminating means from which 6 distinguishes a bloodshot-eyes field, and a processing means by which 7 performs bloodshot-eyes correction processing, The magnetic head which is an input means for the output memories by which 8 was connected to the processing circuit 7, and 9 to input the photographing condition information recorded from magnetic recording part 2b of said film 2 at the time of photography, The sexual desire news memory which has memorized the arithmetic circuit which is a calculating means in which 10 calculates the size information of bloodshot eyes based on said photographing condition information, and the sexual desire news which 11 requires for bloodshot eyes, and 12 are configuration information memories which are recording the configuration information concerning bloodshot eyes.

[0015]Drawing 2 is a block diagram showing the composition of an example of said discriminating means 6, and the area processing circuit for which the 1st address memory is inputted the sequential-processing circuit where said sexual desire news is inputted one by one 20, and 21, and said configuration information and size information are inputted 22, and 23 are the 2nd address memory.

[0016]In the above-mentioned example, image formation of the picture on the film 2 is carried out to the photoelectric converter 3 through the object lens 4. The pixel signal changed into the electrical signal with the photoelectric converter 3 is once inputted into the input memories 5. On the other hand, the photographing condition currently recorded on magnetic recording part 2b of the film 2 is read by the magnetic head 9, it is inputted into the arithmetic circuit 10, and the size information of bloodshot eyes calculates.

[0017]A bloodshot-eyes phenomenon will be generated, if the angle theta which the strobe light part 26 and the taking lens 27 of a camera make to the eye of the photographic subject 25 will usually be about 1-3 degrees or less as shown in the explanatory view shown in drawing 3. When distance of the center of the strobe light part 26 and the center of the taking lens 27 was set to d here and object distance is set to L, [0018]

[Equation 1]The relation of tan theta=d/L is materialized.

[0019]If the path of the pupil of eyes is set to x as shown in drawing 4, as shown in the explanatory view shown in drawing 5, size y of the bloodshot eyes reflected to the film 2 will

set the focal distance of the taking lens 27 to f, [0020]

[Equation 2]It becomes y=xxf/L. Therefore, if said f and L are known, the pupil diameter y of the film 2 is known.

[0021]Since the value of theta becomes small so that the value of L becomes large from said one number, [0022]

[Equation 3]When set to L>d/tantheta, bloodshot eyes will occur. Therefore, several 2 and several 3 [0023]

[Equation 4]The value of y used as y<xxfxtan theta/d is a path of the bloodshot eyes on the film 2.

[0024]If distance d[between the existence of ** stroboscope use, the focal distance f of ** taking lens, ** taking lens, and a strobe light part] ** is inputted as a photographing condition from several four, since x and theta can be treated as a constant as mentioned above, it can ask for size y of the bloodshot eyes on a film. The value of x of the value of this y is about a maximum of 8 mm as human being's pupil diameter.

Since it is not set to 2 mm or less, a maximum and a minimum can be defined.

[0025]Since the value of said x changes with surrounding luminosities, if there is photometry information at the time of photography, x or theta can be amended and the size information of higher-precision bloodshot eyes can be searched for. If the value of said y is calculated by the camera side, what is necessary will be just to input the existence and y value of stroboscope use as a photographing condition.

[0026]Although the size of the above-mentioned bloodshot eyes is related with a picture on the film 2, it thinks, also when reading a picture in the expanded print, and is considering that expansion or the reducing magnification K is a photographing condition in this case, [0027]

[Equation 5]y' is computed as size information of bloodshot eyes from the formula of y'=yxK.

[0028]The operation of the size information of bloodshot eyes mentioned above is performed based on the various above-mentioned photographing condition information in the arithmetic circuit 10, and is outputted to the discriminating means 6. Sexual desire news is outputted to the discriminating means 6 from the sexual desire news memory 11, and configuration information is further sent to it from the configuration information memory 12.

[0029]Since a color is determined by human being's blood, and what is necessary will be to make only the specific wavelength band of a picture into a processing object, bloodshot eyes use said sexual desire news.

[0030]Since the shape of bloodshot eyes is the shape of a pupil and is considered to be an approximate circle form, configuration information uses circular information for bloodshot-eyes distinction. Since a size can also be distinguished when carrying out shape distinction, it may distinguish including said size information.

[0031]Next, the discriminating operation of the discriminating means 6 is explained. When the pixel information concerning the inputted image shown in drawing 6 (a) at the input memories 5 is memorized, the sequential-processing circuit 20 stores in the 1st address memory 21 the address of the pixel which agrees from pixel information with reference to said sexual desire news. Since only the red system portion of the shadow area of drawing 6 (a) will be extracted at this time, the address of the slash part shown in drawing 6 (b) is obtained.

[0032]Furthermore, the area processing circuit 22 stores in the 2nd address memory 23 the address of the field which agrees from the 1st address memory 21 with reference to said size information and configuration information. At this time, the address of the slash part of drawing 6 (c) corresponding to bloodshot eyes will be obtained from the slash part of drawing 6 (b).

[0033]The address of the pixel which should be processed as mentioned above is obtained, and the processing circuit 7 outputs the pixel signal which processed the information on the input memories 5 and performed bloodshot-eyes correction processing to the output memories 8 with reference to the 2nd address memory 23. The pixel which does not need processing is outputted to the output memories 8 as it is.

[0034]Bloodshot-eyes correction processing of said processing circuit 7 is explained. That is, since it is absorbed within an eye, many of lights which entered into the pupil in the state of fixed light are not concerned with the color of the iris which forms a pupil, but they reduce the luminosity of a bloodshot-eyes field and make it black. However, since many phenomena in which catoptric light is **(ed) by a part of cornea on the surface of an eyeball called a catch light will occur if speed light photography is carried out, luminosity is raised in this case and it is selectively made white.

[0035]Although obtained by reading what was recorded on magnetic recording part 2b of the film 2 in photographing condition information, a user may enable it to input photographing condition information manually in the above-mentioned example.

[0036]In the above-mentioned example, although sexual desire news, size information, and configuration information were used as a distinction standard of bloodshot eyes, if the image information of the circumferences, such as a white part of the circumference of iris or shape of eyes, is used together as a distinction standard, a higher-precision bloodshot-eyes field can be extracted.

[0037]
[Effect of the Invention]As explained above, in this invention, the bloodshot-eyes field in a taken image is distinguished automatically, and correction processing of a bloodshot-eyes field is performed.

Therefore, bloodshot-eyes correction processing can be performed after photography, and the image processing device which moreover does not spoil any image quality other than a bloodshot-eyes field can be provided.